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(54) POWER SUPPLY VOLTAGE MONITORING DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To protect an electronic device to be a load from being damaged and malfunctioned when input power supply voltage abnormally falls.
SOLUTION: This power supply voltage monitoring device is constituted of a voltmeter 1 and an ammeter 3 for detecting the voltage and current of an input power supply, a computer 2 for calculating impedance while storing the detected voltage and current value, switches 5 to 7 for supplying power to load devices 8 to 10 to be plural loads, and a switch control circuit for driving the switches 5 to 7, the impedance of the input power supply is calculated from the detected voltage and current and the drop of the input power supply voltage at the time of connecting the load is

2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] A voltmeter which detects voltage of input power, and an ammeter which detects current of input power, A computer which memorizes a voltage value and a current value which were detected with said voltmeter and said ammeter, and calculates an impedance from said memorized value, and said input power and n to the 1 to n-th (n) Supply voltage supervisory equipment characterized by consisting of switch control circuits which drive a switch which turns on and off parallel connection with load equipment of two or more integer individuals, respectively, and said switch.
[Claim 2] Supply voltage supervisory equipment according to claim 1 characterized by providing the following. Said computer is a storage means to memorize a voltage value measured with said voltmeter and said ammeter when connecting load equipment of up to [from 1 (n-1)] watch to said input power, and a current value. A count means to calculate an impedance of input power based on a voltage value and a current value which were acquired with said storage means A presumed means to presume a fall of input power voltage based on an impedance of input power obtained with said count means
[Claim 3] If said computer is below predetermined voltage, input power voltage obtained with said presumed means Control said switch control circuit so that said n-th load equipment is not connected with said input power, and if said input power voltage is more than predetermined voltage Supply voltage supervisory equipment according to claim 2 characterized by controlling said switch control circuit so that said n-th load equipment connects with said input power.
[Claim 4] Said count means is Vn and In about Zn, said voltage value, and a current value, respectively in an impedance of input power at the time of connecting said n load equipments. If it carries out,

$$Z_0 = (V_0 - V_{0-1}) / (I_0 - I_{0-1})$$

Supply voltage supervisory equipment according to claim 2 characterized by being come out and given.
[Claim 5] Said presumed means is supply voltage supervisory equipment according to claim 2 characterized by being given by Vn '=Vn-1-Zn-1 xIn ', when the sum total consumed electric current of Vn ' and n load equipments is made into In ' for presumed supply voltage at the time of connecting said n loads.
[Claim 6] Said n load equipments are claims 1, 2, 3, and 4 and supply voltage supervisory equipment of five publications which are characterized by the consumed electric current being known respectively.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to the input power voltage monitor method and equipment of an electronic instrument.
[0002]
[Description of the Prior Art] Various methods are proposed by conventional input power supervisory equipment for the purpose which prevents failure and malfunction of an electronic instrument from the abnormality fall of input power voltage. For example, JP,61-125630,A, JP,61-168028,A, JP,1-282623,A, etc. have a publication.
[0003] With the above-mentioned conventional technology, each is supervising the fall of input power voltage for input power voltage as compared with a certain reference voltage.
[0004]
[Problem(s) to be Solved by the Invention] In the conventional supply voltage supervisory equipment mentioned above, the serviceability of a power supply is undetectable beforehand to a power up. Therefore, as a result of switching on a power supply, if the load current is large, supply voltage may fall, a detector may operate, and protected operation, such as making the power supply to a device input into **, may operate.
[0005] In this case, although the load device was normal, it had the trouble that a protection network would malfunction by powering on.

[0006] It will generate notably and especially this problem makes the reliability of equipment have been to deteriorate in a portable mold electronic instrument which changes a use power supply for every employment.
[0007]
[Means for Solving the Problem] In order that this invention may solve a trouble in the conventional technology, this invention memorizes a voltage value and a current value detected with a voltmeter which detects voltage of input power, an ammeter which detects an input current, and said voltmeter and ammeter, and it has a computer which calculates an impedance from a value by which storage was carried out [above-mentioned], the switch which is intermittent, respectively in connection between said input power and two or more load circuits, and the switch control circuit which drive said switch.
[0008]
[Embodiment of the Invention] Drawing 1 is one example of this invention. In drawing 1 , a voltmeter 1 detects supply voltage and outputs a detection result to a computer 2. An ammeter 3 detects supply current and outputs a detection result to a computer 2. A computer 2 calculates source impedance from the detected input voltage and an input current. The switch control circuit 4 drives switches 5, 6, and 7, and controls connection and separation with the load equipments 8, 9, and 10 and a power supply. The consumed electric current of the load equipments 8, 9, and 10 is known, and the consumed electric current makes it small at order with a small number.
[0009] The principle of operation of this invention is explained using drawing 1 . In drawing 1 , a voltmeter 1 and an ammeter 3 detect the voltage and current of input power respectively, and output the data which can process a computer 2, for example, digital value, to a computer 2.
[0010] The switch control circuit 4 has the function which notifies the switching condition of switches 5, 6, and 7 to a computer 2. A computer 2 memorizes the detection data of the voltmeter 1 of the condition which all switches opened, i.e., the unloaded condition before supplying a power supply to the load equipments 8, 9, and 10. It is this storage value V0 It carries out.
[0011] Next, in powering on, the switch control circuit 4 closes a switch 5 first, and connects load equipment 8 with least consumed electric current to a power supply. Under the present circumstances,

the switch control circuit 4 notifies having closed the switch 5 to a computer 2.
[0012] At this time, a computer 2 judges whether the detection data from a voltmeter 1 is less than the specified voltage value (Vs). When judged with it being less, a computer 2 outputs a control signal so that protected operation which opens a switch 5 to the switch control circuit 4 may be carried out. On the other hand, when judged with the detection data from a voltmeter 1 having exceeded the specified voltage value, as for a computer 2, the detection data of a voltmeter 1 and an ammeter 3 is memorized. They are these storage values V1 I1 It carries out.
[0013] The above-mentioned storage value inside a computer is illustrated to drawing 2 . A computer 2 calculates the impedance of input power by the degree type based on these storage values. It is an impedance Z1 It calls.
[0014]

$$Z_1 = (V_0 - V_1) / I_1$$

Next, based on the above-mentioned value, the switch control circuit 4 presumes the supply voltage at the time of closing a switch 5 and a switch 6 by the degree type.
[0015] Presumed supply voltage is made into V2 '.
[0016]
V2 '=V1-Z1 xI2 ' (2)
Here, I2 ' is the known sum total consumed electric current of the load equipments 8 and 9.
[0017] A computer 2 judges whether V2 ' which it is as a result of count is less than the specified voltage value. When judged with it being less, a computer 2 forbids connection of a switch 6 to the switch control circuit 4. When judged with on the other hand V2 ' which it is as a result of count having exceeded specified voltage, a computer 2 permits connection of a switch 6 to the switch control circuit 4.
[0018] Based on the connection propriety judging of the above-mentioned switch 6, the switch control circuit 4 closes a switch 6. The switch control circuit 4 is notified to the purport and computer 2 which

closed the switch 6.
[0019] At this time, a computer 2 judges whether the detection data from a voltmeter 1 is less than the specified voltage value (VS). When judged with it being less, a computer 2 outputs a control signal so that protected operation which opens a switch 6 to the switch control circuit 4 may be carried out. This actuation is protected operation when the estimate by count is different from an actual circuit. On the other hand, when judged with the detection data from a voltmeter 1 having exceeded the specified voltage value, as for a computer 2, the detection data of a voltmeter 1 and an ammeter 3 is memorized. They are these storage values V2 I2 It carries out.
[0020] The above-mentioned storage value V2 inside a computer I2 It illustrates to drawing 2 . A computer 2 calculates the impedance of input power again by the degree type based on these storage values. It is an impedance Z2 It carries out.
[0021]

$$Z_2 = (V_1 - V_2) / (I_2 - I_1)$$

Next, the above-mentioned value is used and the switch control circuit 4 presumes the supply voltage at the time of closing switches 5, 6, and 7 by the degree type.
[0022] Presumed supply voltage is made into V3 '.
[0023] V3 '=V2-Z2 xI3 ' -- here, I3 ' is the known sum total consumed electric current of the load equipments 8, 9, and 10.
[0024] A computer 2 judges whether V3 ' which it is as a result of count is less than the specified voltage value. When judged with it being less, a computer 2 forbids connection of a switch 7 to the switch control circuit 4. When judged with on the other hand V3 ' which it is as a result of count having exceeded specified voltage, a computer 2 permits connection of a switch 7 to the switch control circuit 4.
[0025] As mentioned above, according to this invention, before closing a switch and supplying a power supply to load equipment, the fall of input power voltage can be presumed beforehand. In order to control connection of a switch by this presumed result, it is effective in malfunction of the load equipment which input power voltage falls and

generates being avoidable.
[0026] In this example, as an example, although load equipment was made into three sets, if load equipment is two or more sets, an effect equivalent to the effect indicated by this example will be acquired. moreover, even if there is a load equipment, a load comes out not to mention what should just become independent to plurality.
[0027]
[Effect of the Invention] As mentioned above, the impedance of input power is calculated from detection voltage and current, the fall of the input power voltage when connecting a load is predicted beforehand, and it has the effect that failure and malfunction of the electronic instrument resulting from the sag of a power up are avoidable in advance.

[Translation done.]